
Defence Procurement in Singapore

By

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Introduction

For the benefit of those who are new to Singapore, let me first introduce you to Singapore. Singapore is a small country in South East Asia, comprising about forty-nine islands and we have a land area of about 650 square km (and growing) and four million people according to a recent census report. We lack natural resources, but despite our size and resource constraints, Singapore has enjoyed government domestic product (GDP) growth rates of about 8 percent to 10 percent per annum over the past years until the regional economic downturn a few years ago. However, economic recovery is in sight and Singapore is expected to register an economic growth of about 7 1/2 percent to 8 1/2 percent this year. For the long-term, we hope to maintain a sustainable GDP growth of about 6 percent.

We operate an open economy plugged into the global market system. In line with our open policy, Singapore is also a member of the 1994 World Trade Organization (WTO) plurilateral agreement on government. We provide an environment favourable to foreign investors. We have a well-educated and trained workforce, complemented by well-developed information technology, communications and transportation infrastructure, to support business. Singapore is ranked amongst the most competitive economies in the world. Such economic progress is possible because of peace and stability, which are underpinned by a firm national security foundation. And the cornerstone of our security is a strong Singapore armed forces (SAF). Our government is therefore committed to invest up to 6 percent of our GDP in defence, and I might add that this commitment did not weaken during the economic downturn.

Given our limited resources and space constraints, the use of technology is therefore critical in giving the Singapore armed forces a qualitative edge. We acquire weapon systems that give us the same or more firepower but require fewer men (to operate the systems). To overcome the constraint of limited training resources, simulators are used extensively for training our troops, in addition to training overseas. We automate and computerise as many processes as possible to enhance efficiency and to reduce the manpower required to undertake the processes. In short, we use technology as a force multiplier.

We have adopted an approach called integrated defence development. Integrated defence development recognises that there are synergies among parts that when integrated promote better utilisation of resources. It encompasses integration of operations and technology; and integration over people and organisations in ministry of defence, SAF, the local defence industry and the academic and research institutions.

The Technological Edge

How does DSTA provide SAF with the technological edge? This is achieved through a number of different but complementary approaches.

- **Customisation.** We customise acquired equipment and systems and develop our own strategic equipment and systems. Customisation is both necessary and critical as off-the-shelf solutions are usually designed for other armed forces and may not fully meet local conditions and requirements. Customisation requires us to fully understand and exploit the performance limits of existing equipment and systems, and therefore enables us to maintain a strategic edge.

- **Life Cycle Management (LCM) Methodology.** We ensure that we spend our defence budget prudently and maximise the value of the money spent. We are concerned not only with the initial costs of acquisition, but also with the total costs of operation and maintenance over the entire life cycle. We have institutionalised a systematic life cycle management approach to weapon systems acquisition from the identification of a need to the retirement of the system. Trade-off decisions between cost, schedule and performance are made at appropriate checkpoints to ensure that the most cost-effective solution is acquired and implemented. Underlining this approach, we always consciously consider the alternative of upgrading an existing system as opposed to replacement, that is, acquiring a new system.

- **Smart Buying and Systems Engineering.** To the extent possible, we buy whatever meets our requirements from the market to exploit the efficiency of the marketplace. We can then improve on them at incremental effort for greatly enhanced performance. Thus, in order to be a smart buyer, we must be able to clearly define our requirements and specifications, and select the most appropriate technological solution. This requires a strong systems engineering capability. Systems engineering and integration involves the harmonisation of many state-of-the-art sub-systems into platforms, and the final weapon system is tailored to meet our requirements. Through synergistic effects, the final weapon systems' capability is more than the sum of its parts. We work closely with our strategic industry partner, the Singapore Technologies (ST) group of companies, to build up such technological capability. Examples of successful programs include the upgrade of the A-4 and F-5 aircraft and the AMX-13 tanks. Other indigenous programmes include the Patrol Vessel Programme which was undertaken without the help of external consultants. New ideas were incorporated in the application of computational techniques for whole ship-shock analysis, design of the hull, and the use of water-jet propulsion.

- **Operations-Technology Integration.** The tight operations-technology integration between defence engineers and scientists and their users at all levels is our competitive advantage. Defence engineers and scientists participate in SAF exercises to appreciate operational problems and provide more effective procurement and engineering support and has resulted in a shorter development cycle for complex systems.

Such close partnership has seen the successful development and introduction of several weapon systems. Recent examples include the Bionix infantry fighting vehicle which was completely conceived, designed and constructed in Singapore with our industry partner, ST Kinetic. The SAR21 assault rifle was the result of a successful collaborative effort between the SAF, DTG (now DSTA) and industry. The locally built landing ship tank is another case in point.

Procurement System

We source internationally for our weapon systems and support. We work within public sector procurement guidelines, and our procurement system is ISO-9000 certified. We subscribe to an open and transparent tender system. Our rules and objectives are clear with adequate checks and balances. We have a policy of dealing and contracting directly with all manufacturers and suppliers in the procurement of defence equipment. There is no need to use intermediaries to do business with us although some suppliers may feel more comfortable with some form of presence or representation in Singapore.

In procurement, we are guided by a simple principle to seek the most cost-effective system that meets our requirements. We encourage competition to secure the best package the market can offer. Contractors should try to understand our needs and expectations as a customer. Through our acquisition projects, we seek technology and capability to assure future support. We expect the contractor to commit to long-term support on spares and service, including prices, through blanket ordering agreements.

For major programmes, tender proposals are subject to rigorous evaluation using the analytical hierarchical process (AHP). Technical, schedule, financial, and commercial aspects of each proposal are assessed in a two-envelope system to ensure that the most cost-effective system is selected. The assurance for our contractors is that every offer is evaluated on its own merit. There is no preference for any country or source.

Defence procurement is inherently complex. Over the years, we have continuously sought to find innovative ways in our acquisition and procurement. Let me illustrate with four examples.

- Use of Commercial-Off-The-Shelf (COTS) products. Many COTS products, particularly computer hardware and software, are technologically advanced and readily available. We therefore leverage on COTS technologies and equipment for military use. The use of COTS allows systems to be regularly updated to enjoy the benefits of emerging technologies. Such applications reduce the need for customisation and shorten development cycles. They also provide better supportability and help reduce overall life cycle costs.

- Tapping on the internet. In recent years, we have witnessed the explosion of the internet and dot.com fever and the exponential growth of electronic commerce. In April 1998, we launched the ministry of defence internet procurement system (MIPS) to enable the purchase of recurrent spare parts over the net. With MIPS, the ministry of defence is able to tap directly into the international marketplace. The MIPS is a secure system that employs public key encryption technology. Suppliers who register as trading partners in MIPS are issued smart cards. The smart card serves as an identity card and fulfils confidentiality and non-repudiation requirements. With the smart card, trading partners can submit their bids and invoices directly to us. The system allows easy access and presents equal opportunity to both local and overseas suppliers to do business with us.

The MIPS is integrated into the supply chain. It is integrated with our procurement, logistics and finance systems. This facilitates a seamless process from requisition to sourcing; to placing of orders, to delivery and inventory management, to invoicing. In developing MIPS, we had taken the opportunity to streamline and re-engineer our processes. We looked beyond the internal processes to include interfaces with our suppliers. The end result was a more efficient and

effective supply chain. The challenge with e-commerce is in keeping pace with technology and maintaining its relevance and user-friendliness to our trading partners. We have already implemented three new versions since April 1998, to incorporate new and better functionalities. But we can do more. To date, we have only implemented MIPS in Singapore and the U.S. Efforts to launch MIPS in Europe have unfortunately been hampered by export licensing issues over the encryption technology till early this year. MIPS is in line with our government's drive to make Singapore an e-commerce hub. It will spearhead public procurement in cyberspace as MIPS is currently being adapted for use across the civil service of Singapore by early next year. Meanwhile we are currently deliberating how to take it to the next plane. (The MIPS website is <http://www.mips.mindef.gov.sg>)

- **Lease-to-Own Arrangement.** A lease-to-own arrangement is by itself not a novel idea. Such an arrangement confers obvious advantages to the buyer in terms of financial loading and at the same time allows the operator to enjoy use of the equipment. However, it is not a commercial practice to use such an arrangement for procurement of military equipment, especially if we are talking about fighter aircraft.

That did not stop us from exploring the option for our F-16C/D's. As expected, there were a number of issues to resolve. For a start, the U.S. government did not handle such deals before. Although significant military equipment are customarily purchased through the foreign military sales (FMS) program, special approval was given to allow us to work out a package directly with the contractor. Besides avoiding payment of the 3 percent FMS admin fee then (it is 2.5 percent currently), a commercial deal also puts MINDEF in a position to secure terms which were more favourable than under the FMS LOA. We also managed to get the aircraft earlier than would have been the case under FMS. The F-16C/Ds lease-to-own arrangement was a first in many ways. With perseverance and effort by everyone involved, the outcome was very satisfactory. For the aircraft manufacturers, they received their payments in a timely manner and for the ministry of defence, we avoided huge capital outlay up-front and trained our pilots earlier than we would have via outright purchase. We have since entered into a similar arrangement for our Chinook helicopters.

- **Partnership Agreements.** In the past, our relationship with our contractors had tended to take an adversarial customer-supplier relationship. Our view of our suppliers was that there were still areas for improvement in cost and quality. Our suppliers' view of us was that there were unstable workload, unreasonable price expectations, excessively tough contractual terms and inadequate funding or sharing of risks in ventures requiring capital investments. Period contracts were of relatively short duration, typically up to three years at best then. Much time was spent negotiating for renewal of these contracts. In 1993, ministry of defence decided to put in place long-term contracts for strategic requirements which addressed these issues. The first contract was for aircraft maintenance with ST Aerospace. Under the contract, we agreed to a specific baseload to enable the company to plan its resources better. Work tasks were re-packaged to facilitate better management, and mechanisms were put in place to motivate the contractor to exceed performance requirements. The results were encouraging. Among other things, turn-around times improved by about 12 percent (or about 2 months) and annual cost savings estimated at two million Singapore dollars were generated. We have since implemented many more such agreements in various areas of platform, systems and software maintenance.

We have continued to fine-tune and find ways to enhance the partnership approach. In a recent contract for design-build-and-operate mode of a central warehouse, we have adopted an open-

book approach. An external auditor will be engaged to audit the costs for the program. The contractor commits to deliver a given service level at a certain pre-agreed price. If the audited costs are lower than the projected costs, the contractor gets a share of the savings.

A mechanism is also put in place to jointly identify initiatives which would bring about better solutions and/or cheaper ways of doing things. Increasingly, we find benefit in working in partnership with contractors to address mutual concerns and arrive at a superior outcome for the end-user.

Defence Science & Technology Agency (DSTA)

Now I would like to talk about our new entity Defence Science and Technology Agency (DSTA) which I briefly spoke about during the Second IAPS(P) Seminar in Seoul, Korea.

The Ministry of Defence is by all accounts a very large ministry in Singapore. Technology is one of the three broad functional areas in MINDEF the other two being defence policy and administration. The scope of defence technology is very wide and covers policy, planning as well as implementation. While this structure had served us well in the past, it was not nimble and responsive enough to meet the challenges of the future. A decision was therefore taken to separate the core functions of policy formulation, planning and resource allocation from the service provider functions, the latter being given added flexibility and autonomy to make implementation decisions.

As a result, Defence Science and Technology Agency, which evolved primarily from the former Defence Technology Group (DTG) was formed on 15 Mar 2000. Defence Science and Technology Agency is a separate legal entity legislated as a statutory board by an act of parliament. Simply put, DSTA is an executive agent of Ministry of Defence and empowered by the *DSTA Act* passed by parliament to act on the ministry's behalf. And it retains flexibility and autonomy for its business operations, thereby positioning itself to better anticipate and respond to the changes in trends and technologies and be more effective in providing the Singapore armed forces with the strategic edge.

Mission

Defence Science and Technology Agency's mission as enshrined in the *DSTA Act* is "To harness science and technology to meet the defence and national security needs of Singapore."

Roles and Functions

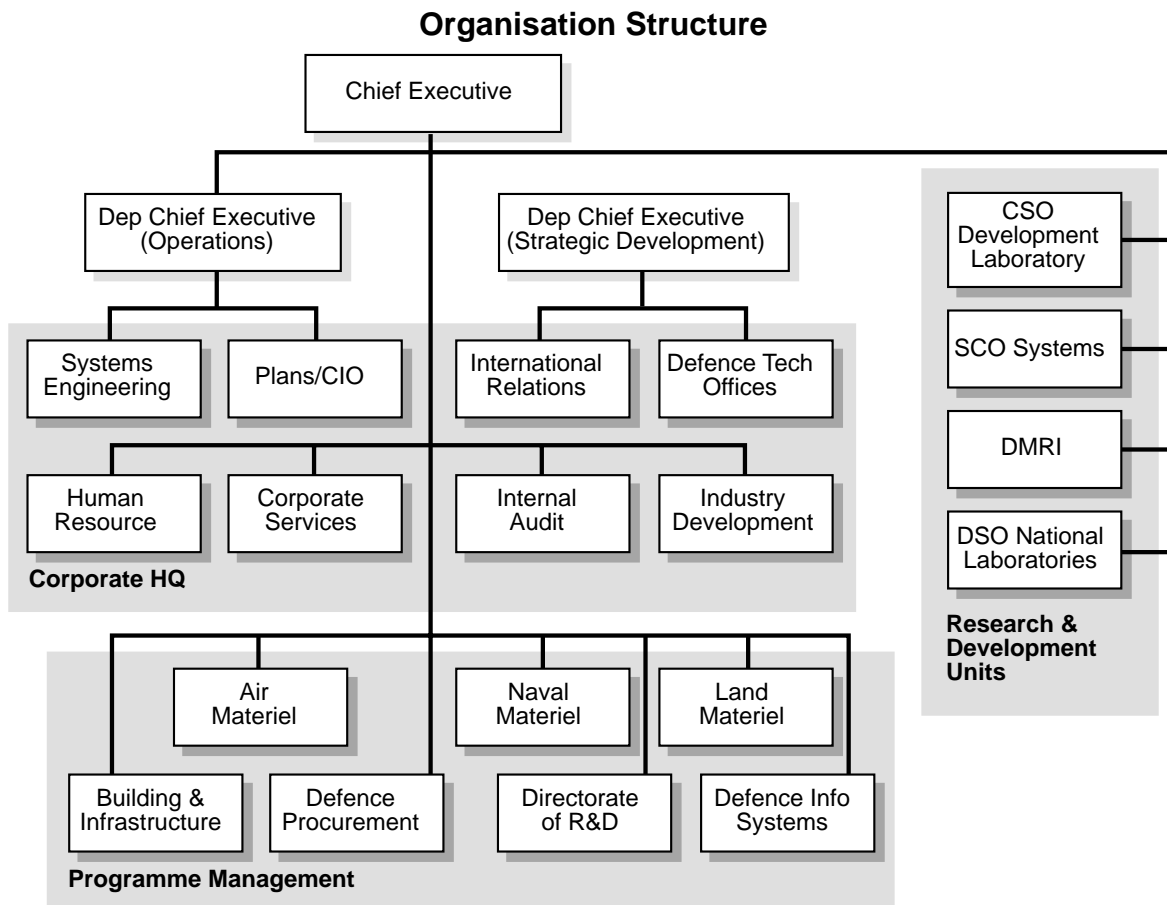
Broadly speaking, DSTA has four main roles and functions. It is the procurement agency for MINDEF. It will implement the technology plan of MINDEF, and this includes the following activities as shown in the figure. Defence Scientific and Technology Agency is also the adviser to MINDEF on science and technology matters and is also responsible to promote defence science and technology in Singapore.

Organisation Structure

Let me now highlight some of the salient points of the DSTA organisation structure. First, there are two groups of line entities in DSTA. Program management entities and design and

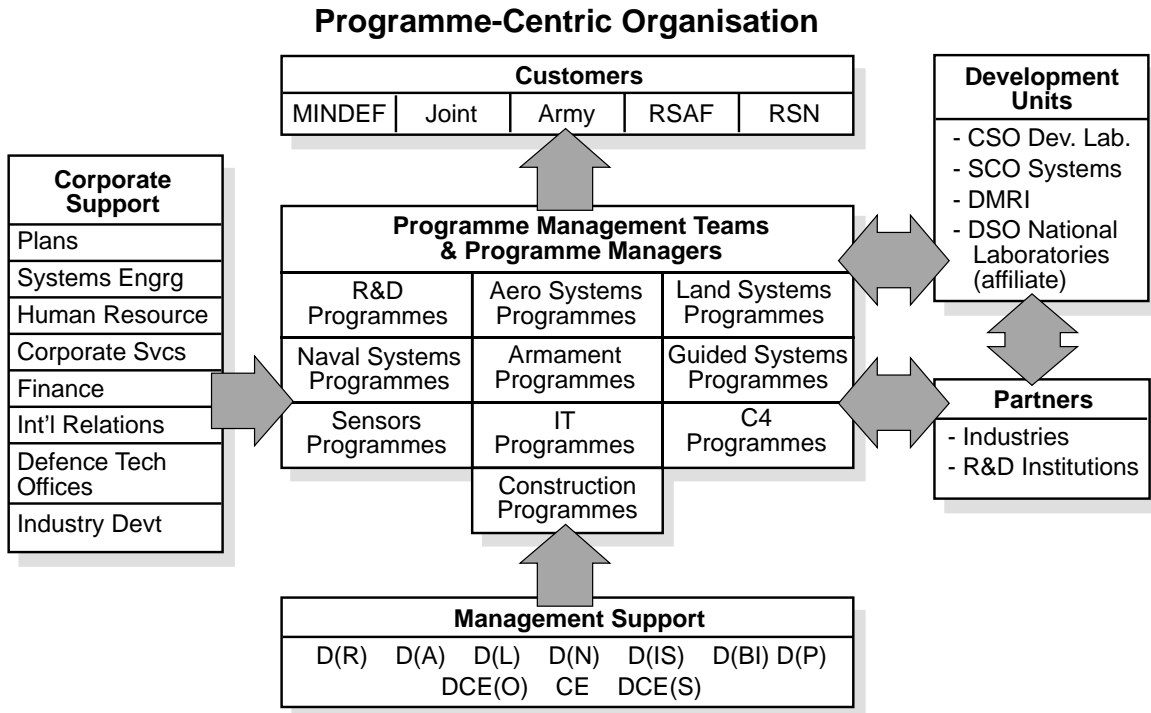
development entities. This allows for a better alignment of functions ie it clearly demarcates the project acquisition management role from the “developer cum doer” or producer role especially in the C4 and IT domains.

Second, we now have a flat organisation structure, though it may not be fully evident from this chart.



Third, the defence research and development (R&D) arm of MINDEF and Defence Scientific Offices National Laboratories, which was corporatised in April 1997, is now brought under the ambit of DSTA as an affiliate company. This will ensure that DSO’s defence R&D remains closely integrated with the work of DSTA and facilitate the smooth transition of technologies from R&D to full-scale development.

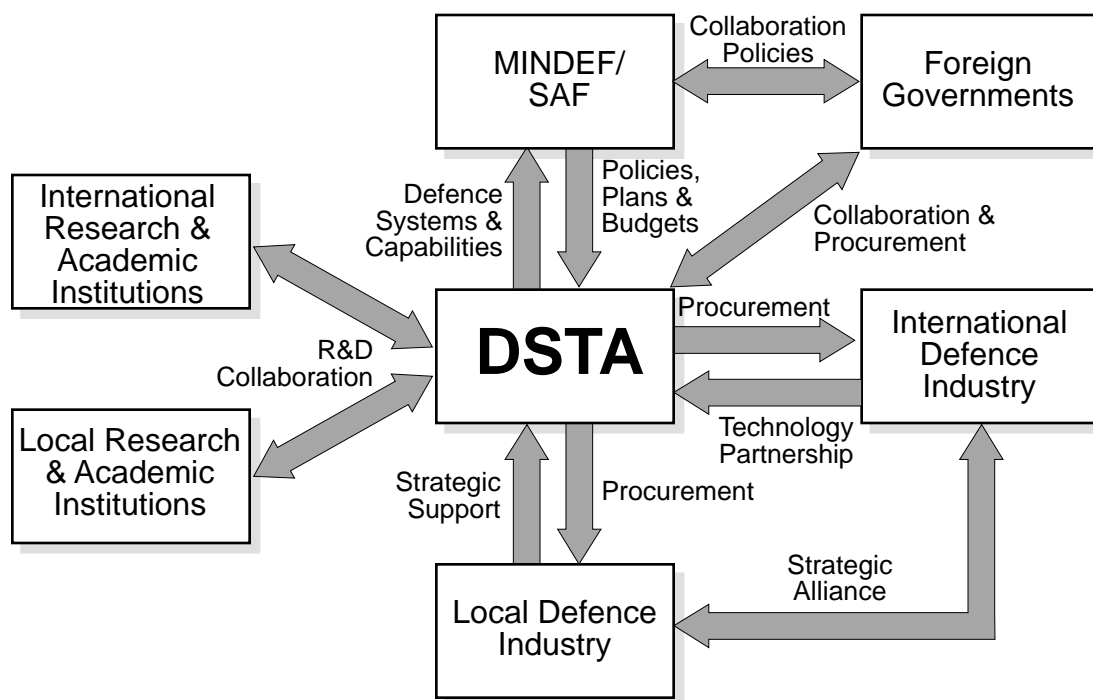
At the operational level, our structure is programcentric i.e., organized around programs and it looks as shown in the chart on the next page. The programs within the various programcentric entities shown are managed by program management teams led by program managers. These program managers are like “front-line entrepreneurs” delivering products and services to their customers. They have been given greater authority to manage their programmes, and they will be directly accountable to their customers. The program management teams will also draw on the required expertise from the support organisations, e.g., contracting specialists from procurement who will be an integral part of the program management teams. Senior management’s role is essentially to provide guidance and support to the program managers.



To ensure better focus and responsiveness to our principal customers, i.e., MINDEF and the joint staff and the three services, top executives have been designated as account managers or focal points for the respective customers and they are director (land), director (air), director (navy) and deputy chief executive (operations) for the Army, Air Force, Navy and MINDEF and Joint Service respectively. The development cum producer units and industry partners and research and development institutions will also interact with the program management teams as shown. I would like to draw your attention to three new entities, viz industry development whose role is to promote and foster the build-up of technological capability with strategic local industry partners and they also have a secondary role to facilitate defence export, and international relations and defence technology offices. Defence Science and Technology Agency has two overseas defence technology offices, one in Paris, France (to cover Europe) and the other in Washington, D.C. Collectively along with international relations, their role is to promote, closer technological cooperation with foreign governments and suppliers by facilitating the establishment of linkages with them. The DTOs will also assist in the coordination and resolution of project management's issues.

The chart on the next page shows Defence Science and Technology Agency's linkages with the various parties. MINDEF/SAF defines the policies and plans and also provides the resources, i.e., budgets, and Defence Science and Technology Agency delivers defence systems and capability. Defence Science and Technology Agency is the procurement arm of MINDEF and will act for MINDEF on defence procurement matters, such as tendering, equipment selection, contracting and follow-on project management activities like design reviews and acceptance. In this respect Defence Science & Technology Agency will continue to work within government procurement guidelines, and shall continue to act in the best interests of MINDEF. Defence Science and Technology Agency also supports MINDEF in the implementation of technology collaboration agreements with local and overseas partners, including foreign governments.

DSTA Linkages with External Parties



In conclusion, I would just like to say that the formation of Defence Science and Technology Agency presents us with a unique opportunity to forge and create a new dynamic and creative organisation for the defence and security needs of Singapore. With the added flexibility and autonomy, we in Defence Science and Technology Agency look forward to an environment that promotes greater initiative, innovation and entrepreneurship. Our permanent secretary, Mr. Peter Ho, in his keynote address has already outlined his vision for MINDEF in the new economy. The restructuring is only the beginning of our journey.

About the Author

Chinniah Manohara has been the Director of the Defence Procurement Division, Ministry of Defence (MINDEF), Singapore since June 1991. With the formation of Defence Science and Technology Agency in March 2000, he continues to hold the appointment of Director Procurement and is also concurrently Director Land Materiel in Defence Science and Technology Agency.

Manohara has over 29 years of experience in the full spectrum of defence acquisition i.e., technical evaluation, technical modification, logistics management, project management, contract negotiations, and contract establishment. His career in MINDEF began in March 1971 when he returned from the University of Western Australia, Perth, where he had studied mechanical engineering under the Colombo Plan Scholarship.

His early years were spent mainly in the Republic of Singapore Air Force (RSAF) where he was part of a group of engineers responsible for the engineering management of the RSAF fleet. He gradually progressed into logistics management and then project management. He

successfully managed the RSAF's E-2C program in Bethpage, New York during which he worked closely with the U.S. Navy and Grumman.

Upon his return from New York, he spent a year in the Defence Materiel Organization as assistant director, land systems, managing army projects, before taking up the Assistant Director, Defence Procurement Division appointment in July 1988, and later as director from June 1991. Since then, he has been involved in all major procurements undertaken by the Singapore armed forces and MINDEF, Singapore.